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ABSTRACT

This study examined the effects of a computer-mediated networked learning environment on the writing of fifth grade students who used word processing to write four texts collaboratively during an 8-week period. A telecommunication network was utilized to allow the students in the experimental group to send their work via e-mail to an audience of readers who read and responded to their writing. Findings suggest that when students knew they would be sending their writing to an outside reader and when they received a prompt response, there was a positive effect on the quality of writing. Results also suggest females used the computer technology when the environment was cooperative and they had equal access to the equipment. There is also indication that writing to communicate to an authentic audience outside the classroom may have contributed to the males in the experimental group scoring higher on the writing assignments than the males in the control. (Contains 20 references.) (Author/JLB)

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Analysis of the Effect of Networking on Computer-assisted Collaborative Writing ina Fifth Grade Classroom

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Analysis of the effect of networking on computer-assisted collaborative writing in a fifth grade classroom

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Our study examined the effects of a computer-mediated networked learning environment on the writing of fifth grade students who used word processing to write four texts collaboratively during an eight week period. A telecommunication network was utilized to allow the students in the experimental group to send their work via e-mail to an audience of readers who read and responded to their writing. Findings suggest that when students knew they would be sending their writing to an outside reader and when they received a prompt response, there was a positive effect on the quality of writing. Results also suggest females used the computer technology when the environment was cooperative and they had equal access to the equipment. There is also indication that writing to communicate to an authentic audience outside the classroom may have contributed to the males in the experimental group scoring significantly higher on the writing assignments than the males in the control.

The computer is too often the starting point when we investigate the role of technology in schools. Instead of beginning with the machine, many theorists advise that we should begin with the learner and the processes that we need to teach and then examine how we can use technology to create meaningful learning experiences [1,2]. This shift of focus implies that we need to require that technology be unobtrusive, even transparent, [3] as we search for ways that we can create interactive social environments that empower the learner in the classroom.

This study examines the attitudes and writing of fifth grade students who are developing their writing skills in a functional learning environment (FLE). A FLE, as described by Newman, [4] is an environment where "learning activities have a function or purpose from the point of view of the child." These activities within the classroom should be the result of negotiation between the goals of the teacher and the goals, interests and experiences of the child.

Research in the acquisition of written language suggests that young writers who are developing their writing ability need a classroom environment that encourages writing as a process [5,6] and one that views writing as a form of communication to create meaning within a social context [7,8,9,10]. Evidence also suggests that computer technology can be a tool to assist in creating this type of interactive writing environment [11,12]. The computer used for word processing in the classroom seems to encourage collaborative writing and peer editing of the student's text [13,14,15]. The computer can also be the basis of an environment that can create an authentic writing task for communication [16,17]. Word processing, together with the distance network, can create a functional writing environment as described by Riel [16] and Newman [4].

Riel [16] examined the reading and writing skills of low-achieving students in a computer-supported network and reported that students' attitudes toward writing improved both on and off the computer. Similarly, Newman [4] reported that seventh and eighth-grade students began to write longer texts as they researched and shared information with their "computer pals" in distance locations and he also found that their attitude toward writing improved.

As technology use continues to be developed and refined in schools, a concern about the equity of the use of computers and other technology in the classroom for females and less assertive students has emerged. Reports indicated that a few students, usually males, may dominate the computer and that females did not always utilize the technology that was available in the classroom [15,17,18]. Both the context and the manner in which computers are used in the classroom are important for the participation of girls. When computers are introduced as tools for writing in a collaborative and cooperative context, girls and boys are usually equally involved [15,17].

The purpose of this study was to investigate whether a functional writing environment which included a distance network used to create an authentic audience for young writers could effect the quality of writing produced and the attitude of the

students toward writing and using technology. Specifically, this study examined the following effects of the treatment on fifth grade students' writing and attitude: (1) the effects of a telecommunication audience on the writing as measured by holistic score and word count, (2) the effects of the gender of partners on the quality of writing produced, (3) the effects of the telecommunication audience on the attitude of the students toward writing with computers, writing with a partner and writing to an audience.

Method

Design Overview

The study used a two group design with random assignment of the existing class to either the control or experimental group. Questionnaire analysis revealed no significant difference between the groups in previous use and knowledge of computers. The dependent variables measured were holistic writing scores, word count and attitude survey results. An analysis of covariance was used to examine the effect of the independent variable.

Participants

The subjects in this study were ninety-three fifth-grade students, 45 males and 48 females, enrolled in four, team taught, fifth grade classes in a K-12 public school in a rural midwestern state. The school is one of thirteen Apple Classrooms of Tomorrow (ACOT) schools selected by Apple Computer, Inc. to establish an environment where the students were familiar and comfortable with computer technology. All ninety-three students had access to computers in their classroom. The two team teachers shared a Macintosh computer which was equipped with a modem and telephone line.

The online readers were college of education students (2 males and 8 females) at a midwestern university. Each reader was assigned 2-3 fifth grade students to correspond with during the six week exchange.

Instruments

A pre- and postquestionnaire was given to each student to obtain demographic data and to ascertain the attitude of the student toward writing with computers and writing to an audience. A pre- and postwriting assignment was given to each of the collaborative writing partners. A holistic scoring instrument was used to determine writing quality. The pre- and postwriting assignments were scored using a holistic scoring rubric.

Procedure

The study lasted eight weeks and included a pre- and posttest attitude questionnaire, a pre- and posttest writing sample, as well as four writing assignments in the six weeks interim. Both the experimental and control group used the computer for all writings and all the students were paired with someone of the same gender. The writing assignments incorporated prompts which encouraged the students to use the writing process and to collaborate with their partner on writing the text.

In the experimental group, the four writing assignments were sent by modem using the telecommunication network America Online to the college student readers who functioned as an authentic audience. These students read the fifth graders' writing and made supportive, nonjudgemental comments that were then e-mailed back to the fifth graders within three school days. In the control group, the teachers responded to the texts in their normal fashion by writing comments on the paper and allowing students to choose to put the work in their writing portfolio.

The effect of the computer-mediated telecommunications on the quality of written products and the attitudes of students toward writing was analyzed. The independent variable was the distance network audience. The dependent variables were the holistic writing quality scores, the word count and three attitude composites. The data collected through the pre- and postattitude questionnaires were analyzed using frequency distributions and analysis of covariance to determine if there were changes in students' response to the attitude composites. The data collected from the pre- and postattitude questionnaire were scored on a

Likert-type agreement scale for one to five with a score of five representing a positive attitude.

The first and last writing assignments, which were used as the pre- and posttest samples, were as much alike as possible. The pretest assignment was to write a description of the students' school and the posttest was to write a description of their town. Data from the writing samples, collected before and after the treatment, were analyzed using an analysis of covariance to factor out initial differences and determine if there was a statistically significant difference in the final writing sample.

These two writings samples were coded and holistically scored on a scale from one to six by independent graders. The writing assignments were rated by three college writing instructors who were trained to score using the rubric. Inter-rater reliability was established by developing consistency of rating among the scorers. Each rater received a complete set of all the writing and a description of the writing assignments. Each scorer rated all the texts and the score that occurred two out of three times was assigned to the paper. Text length was also calculated and used as a measure to determine differences in the writing of the two groups.

RESULTS

The major factors of interest were whether or not the students with the computer network linked audience would write longer and higher quality texts, whether their attitude toward writing and computers would change, and whether the girls in the study would utilize the technology rich environment.

The results of the ANCOVA statistical test revealed that there were statistically significant differences on the holistic ratings of writing quality and the text word count measure with students in the experimental group scoring significantly higher than the control.

The study investigated the differences between the two groups by testing the equality of the means from the holistic ratings of writing quality and word count. The holistic writing

scores for the posttest writing sample ranged from 2 to 6 for the experimental group and from 1 to 5 for the control out of 6 possible points. After adjusting for the covariate, the score on the pretest writing sample, the total sample mean was 3.40 (n=90). The experimental group had higher posttest scores (M=3.73, SD=.88) than the control (M=3.12, SD=1.28).

An F statistic from the analysis of covariance (ANCOVA) was utilized to determine if a statistically significant difference existed. Table 1 shows the significant difference between the holistic writing quality score of the control and experimental, $F(1,78)=11.11$, $p<.001$.

Table 1. Comparison of Experimental and Control Groups on the Posttest Holistic Scores Using Pretest scores as Covariate.

Source	SS	df	MS	F
Covariate				
PreScore	36.37	1	36.37	58.03***
Main Effects				
Group	6.96	1	6.96	11.11***
Explained	52.99	4	13.24	21.13
Residual	48.89	78	.62	

***p<.001

The word count on the postwriting sample ranged from 91 to 341 words for the experimental group and from 41 to 260 for the control. The difference in average length of text between the two groups was 59.73 words with significantly longer texts being written by the experimental group than the control. The mean for the experimental group was 173.75 (SD=10.75) and for the control group was 114.04 (SD=8.93). An analysis of covariance was used to compare the means. An F statistic from the ANCOVA was utilized to determine if a statistically significant difference existed. Table 2 shows that a statistically significant difference existed between the experimental and control groups on the average word count of the postwriting sample when adjusted for initial differences on the pretest, F (1,78)=74.77, p<,001.

Table 2. Comparison of Experimental and Control groups on Word Count Using Pretest Count as Covariate.

Source	SS	df	MS	F
Covariate				
PreCount	65268.73	1	65268.73	30.28***
Main Effects				
Group	191811.18	1	191811.18	74.77***
Explained	261370.18	2	130685.09	50.94
Residual	223185.64	78	2565.35	

***p<.001

The study also investigated the difference in the quality of writing as measured by the holistic scores between the male and female writing partners. The females in the study scored significantly higher than the males on the writing quality holistic ratings. The holistic scores on the writing posttest sample ranged from 1.00 to 5.00 for the male writing partners and from 2.00 to 6.00 for the female writing partners. After adjusting for the covariate, the score on the prewriting sample, the total sample mean was 3.63 (n=90). The mean for all the males in the study was 2.98 (SD=0.72) and for the females 3.87 (SD=1.03). An analysis of covariance (ANCOVA) was used to determine if there was a difference in the writing of the male and female partners. The ANCOVA used the results of the preholistic writing score as the covariate to adjust for initial differences. The results of the ANCOVA revealed that a significant difference on the posttest holistic score existed between the males and females, $F(1.78)=11.46$, $p<.001$.

The mean of the writing scores for the males in the experimental group was 3.14 (SD=.56) and for the males in the control group 2.36(SD=.65). The males in the experimental group scored significantly higher than the males in the control on the writing quality holistic ratings, $p<.01$. The mean for the females in the experimental was 4.22 (SD=.80) and in the control it was 4.04 (SD=1.20). This was not a significant difference.

An attitude questionnaire was designed to determine if there were changes in students' response to the survey dependent on the gender of the student and the group assignment. Students' attitude scores were measured using pre- and postquestionnaire results with attitude items classified in the following composites: writing with a computer, writing with a partner at the computer and writing to an audience. The difference in the means of the pre- and postquestionnaire is reported in Table 3 and 4. The attitude difference of males and females was determined using an ANCOVA with the prequestionnaire composite items results as a covariate to adjust for initial differences. There was not a statistically significant difference in the means of the composite attitude items of writing with a computer, writing with a partner, or writing to an audience of the males and females in the study. Although there was no significant difference in this composite, the attitude composite of the females toward writing with a computer and toward writing to an audience was higher than the males.

The attitude questionnaire also measured the difference in the experimental and control groups on the three composites. There was not a statistically significant difference between the experimental and control groups in the means of the composite attitude items of writing with a computer, writing with a partner at the computer, or writing to an audience after the treatment.

Table 3. Summary of the Pre/Post Attitude Composites Dependent on the Gender of the Student.

Attitude Composite	Pre		Post	
	Male	Female	Male	Female
Writing with A Computer	3.82 SD=.83	3.88 SD=.59	3.91 SD=.56	4.09 sd=.48
Writing with A Partner at Computer	2.66 SD=.73	3.01 SD=.66	2.51 SD=.83	2.49 SD=.83
Writing To An Audience	3.17 SD=53	3.94 SD=.58	3.38 SD=.80	3.94 SD=.53

Table 4. Summary of the Pre/Post Attitude Composites Dependent on Experimental or Control Group.

Attitude Composite	Pre		Post	
	Exp.	Control	Exp.	Control
Writing With A Computer	3.65 SD=.54	4.03 SD=.54	3.92 SD=.55	4.06 SD=.51
Writing With A Partner At Computer	2.43 SD=.95	2.48 SD=.80	2.46 SD=.99	2.55 SD=.86
Writing To An Audience	3.67 SD=.73	3.36 SD=.79	3.75 SD=.66	3.53 SD=.80

DISCUSSION

This study attempted to create a functional writing environment similar to the one described by Newman [4] and Riel [18] that used process writing, word processing, collaborative writing groups, and for the experimental group, a distance network audience that functioned as responsive readers of the students' writing. One of the assumptions of this study was that the combination of these variables would create a writing environment that would encourage the students to view writing as communication for a purpose and that prompt, individualized response to a student's writing by a reader outside the classroom would be a motivation factor to encourage writing.

Two measures of writing quality, the holistic scores and average word count, were significantly higher for the experimental group who had the distance network audience than for the control group who wrote as part of a classroom assignment. These significant results indicated that the treatment effected the quality of the written product. These findings support previous research suggesting that an audience that was someone other than the regular classroom teacher and writing that was used to communicate to an audience should influence the quality

of the writing. These finding also contribute to the research suggesting that the computer-mediated telecommunications distance network environment helps students understand writing for a purpose and to communicate to a real audience.

Another assumption was that a supportive and cooperative environment would encourage girls to use the technology. The distance network audience appeared to create an environment where girls were motivated to write to communicate with the out-of-class audience and the supportive collaborative atmosphere encouraged them to effectively use the technology. The results of this analysis of data indicated a functional writing environment that includes cooperative learning and equal access to computers created a learning environment which was positive for both girls and boys.

The addition of the telecommunication network in the experimental group which introduced new technology into the classroom did not affect the results. The girls in the experimental group scored higher on the holistic writing than the boys in this group. Although this might have been expected in normal writing assignments for fifth grade students, earlier research findings indicated female students generally had less involvement and interest in computers and related activities than males.

Lack of involvement or interest of the girls did not seem to be a factor in this study. In the experimental group the girls were well aware of using the computer to access the distance audience using the distance network. This was indicated by their response to the postquestionnaire that measured knowledge of the use of computers to send messages. In fact, the results of the questionnaire indicated that in the experimental group 69.5% of the girls and 66.5% of the boys were aware of using computers for telecommunications.

Another finding from this study was the boys in the experimental group improved significantly in the holistic scoring of the writing compared to the boys in the control. The addition of the distance audience with individual reader response to the student's writing and a more purposeful writing activity may have

contributed to the increase in the writing scores of the males. The findings of this study indicate that boys may be more motivated to write when there is a defined purpose and nonclassroom audience.

The attitude composite that measured attitude toward writing with a computer was positive for both groups and changed very little as a result of the experiment. This may reflect the familiarity of the subjects in this study with using the computer to write. Writing with the computer was not a novel experience for these students and may have been considered a routine classroom activity for them. The lack of a positive attitude toward sharing the computer for writing may have been because the students had been assigned their own computer at the beginning of the school year.

The attitude of both boys and girls toward writing with a partner at the computer ranged from "not sure" to ""disagree" on the Likert scale. This is evidence of a very negative response to this attitude composite which indicates that the students had a negative attitude toward using the computer to write with another student before and after the experimental study. The lack of a positive attitude toward sharing the computer for writing may have been because the students had been assigned their own computer at the beginning of the school year.

The attitude component that measured the attitude toward writing to an audience was very positive. If this composite score reflects normal fifth graders' attitude toward writing to an audience, the creation of an environment that allows students to write to an audience who gives personal feedback to the writer should not be ignored.

Conclusion

The results from this study indicate positive evidence for further research in the use of telecommunications in the classroom. Specifically, the results indicate that a functional writing environment that allows the students to write for authentic audiences will improve the quality of their writing. There is also evidence that girls will utilize new technology

when it is introduced in a supportive and collaborative environment. These findings indicate that the development of the integration of network telecommunications into the classroom curriculum can have positive effects and reinforces the importance, especially for females, of a cooperative, supportive learning environment when new technology is introduced into the curriculum.

Both Vygotsky [21] and Piaget [22] emphasized the importance of environment in learning language where children can interact, explore, and communicate ideas. The computer, together with telecommunications, may have the capability to enrich the classroom writing environment and enhance the process of writing as a cognitive and social interactive process. As theorists continue to search for explanations of how children learn to write and researchers test these theories, perhaps the best indication of the importance of a functional writing environment is that the students sustained an interest in writing and enjoyed writing to the audience on the network. It is hoped that this study will be followed by others that will explore the possibilities of network connections and environmental arrangements in encouraging young writers to develop their writing potential.

References

1. R. Pea and K. Sheingold, *Mirrors of Minds: Patterns of Experience in Educational Computing*. Albex, Norwood, NJ, 1987.

2. M. Riel, *The Educational Potential of Computer Networking*. Paper presented at the Annual Meeting of the American Educational Research Association, 1986.

3. C. Dede, Empowering environments, hypermedia and microworlds. *The Computing Teacher*, 13(3),pp.20-24,1987.

4. D. Newman, Functional environments for microcomputers in education. *Mirrors of Minds: Patterns of Experience in Educational Computing*, pp. 57-67, Albex, New Jersey, 1989.

5. J. Emig, *The Composing Processes of Twelfth Graders*. (Report No. 13). National Council of Teachers of English, 1971.

6. N. Sommers, Revision Strategies of Student Writers and the Experienced Adult Writers. *College Composition and Communication*, 31,pp.378-388. 1980.

7. D. Graves, *Writing: Teachers and Children at Work*, Heinemann, Exeter,New Hampshire,1983

8. M. Farr, *Advances in Writing Research*,1,Albex Publishing Company, Norwood, New Jersey, 1985

9. W. Teale, Toward a theory of how children learn to read and write naturally. *Language Arts*,59,pp.555-570, 1982.

10. A. Herrmann, *Teaching Writing With Peer Response Groups*. (ERIC Document ED211743),1989.

11. G. Hull, The use of microcomputers in basic writing, in *New Directions in Teaching and Research*, L. Bridwell and D. Ross (eds.), Michigan Press, Houghton, Michigan, pp 72-92,1985.

12. L. DeGroff, Is there a place for computers in whole language classrooms? *The Reading Teacher*,43,pp.568-572,1990.

13. C. Diaute, *Writing and Computers*. Addison-Wesley, Reading, Massachusetts,1985.

14. D. Dickinson, Cooperation, Collaboration, and a Computer: Integrating a Computer Into a First-Second Grade Writing Program. *Research in the Teaching of English*, 20(4), pp.357-377.

15. J. Hawkins and K. Sheingold, The Beginning of a Story: Computers and the Organization of Learning in Classrooms. In J. Albertson and L. Cunningham (Eds.), *Microcomputers and Education: 85th Yearbook of the National Society for the Study of Education*. University of Chicago Press, Chicago. 1986.

16. M. Riel, The Computer Chronicles Newswire: A Functional Learning Environment for Acquiring Literacy Skills. *Journal Educational Computing Research*,1(3),pp.317-337, 1985.

17. M. Cole, P. Griffin, and Laboratory of Comparative Human Cognition. *Contextual factors in education: Improving science and mathematics education for minorities and women*. Prepared for Committee on Research in Mathematic, Science, and Technology Education, Commission of Behavioral and Social Sciences and Education, National Research Council. Madison, Wisconsin Center for Education Research, 1987.

18. Center for Social Organization of Schools, *School Uses of Microcomputers: Reports From a National Survey*. Johns Hopkins Baltimore, Maryland,1983-84.

19. L. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*. Harvard University, Cambridge, Massachusetts, 1978.

20. J. Piaget. *The Language and Thought of the Child*. The World Publishing Company, New York, 1959.